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Grades 7-12 Preservice Teacher Preparation Science Program in Riyadh Teachers College in the Kingdom of Saudi Arabia

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Introduction

An Overview of the Saudi Education System

Presently, Saudi Arabia society is witnessing various forms of rapid educational development that reflect on every aspect of life. Education in the broadest sense has always taken place in Saudi Arabia because it is deeply rooted in Islamic faith and tradition, and it is considered the cornerstone of Islamic tradition in Saudi Arabia. Islam dictates that learning is the obligation of every Muslim, man or woman. Portraying it as an obligation gives education the distinction of being a religious duty. As early as the 1900's, religious Islamic *kuttab* schools existed in mosques. Kuttab schools were led by Muslim preachers who were considered teachers (Alsalloom, 1995). The function of the kuttab schools was teaching the Holy Quran and other fundamental Islamic principles as well as basic literacy skills. These schools concentrated on the pedagogical technique of memorization, which had traditionally been the central characteristic of Saudi education (Teachers Colleges Documentary Report, 2000).

Prior to the 1932, unification of Saudi Arabia, a federalized, secular form of education did not exist. The Directorate of Education was established in 1925 to improve the quality of education for Saudi Arabians. Public schools were opened to meet the literacy and knowledge demands necessary to modernize Saudi society. Due to the demanding need to quickly produce high quality of learning outcomes for Saudi children and due to the lack of trained and qualified teachers, the Directorate of Education appealed to people who were able to read and write to become teachers. Those recruits were known as *necessity teachers*. Students began to attend school at a variety of ages but most were older than nine years. These potential teachers studied for a period of four years. Hence,

the students graduating from the necessity schools were approximately between 13-16 years of age. In turn, these new graduates were qualified to teach at the elementary school level. In 1938, the Directorate of Education issued regulations confirming that it had the official responsibility for all educational affairs in the country except for the military academies, which had their own regulations (Teachers Colleges Documentary Report, 2000).

In 1958, the Ministry of Education created a structure of four levels of compulsory education below the higher education level: the pre-school level for children aged 3 to 5 years; the elementary school level, which imparts education for children from the age of 6 to 12 years; the middle school level, which imparts education for children from 13 to 15 years; and the high school level which imparts education for children from 16 to 18 years. High school graduates can then attend a separate higher education institutions and universities (Alsalloom, 1995).

Teacher Training Development Phases

In 1953, a new era in the development of modern education began with an alteration of the Directorate of education becoming the Ministry of Education, which in turn set the over-all standards for the country's education system (Teachers Colleges Documentary Report, 2000). Officials at the Ministry of Education realized how important it was to make an effort to promote and upgrade the elementary schools teachers in order to increase the quality of education for children in the country. Therefore, teaching in elementary schools after studying only four years at the elementary level was no longer acceptable.

Elementary Teacher Institutions (1953-1969). As a result of the push for higher educational standards, in 1953, the Ministry of Education established what were called Elementary Teacher Institutions (ETIs). Graduates of ETIs had the equivalent of middle school level education. In such institutions, to earn a certificate to teach at the elementary school level, the students were required to study three years in addition to their previous four years of elementary school level attendance. The main goal of these institutions was to more fully prepare teachers to teach well at the elementary school level. However, although the educational attendant was increased through ETI schools, ETIs still were criticized in respect to: (a) the studying period was still not sufficient to prepare teachers well enough regarding significant educational foundations, and (b) the ETIs curriculum was not compatible with what was taught in the elementary levels (Alsalloom, 1995; Teachers Colleges Documentary Report, 2000).

Night Teachers Institutions (1955-1965). As the Saudi society was modernizing, ETIs were no longer considered to be scientifically and educationally sufficient to satisfy the huge development in the country. In 1955, therefore, the Ministry of Education opened the Night Teachers Institutions (NTIs). So that practicing teachers could continue their own education on a part-time basis in the evening. The study period required in NTIs was three years. The in-service teachers were required to attend, but there were no additional degrees or certifications granted because the aim of these institutions was to provide more opportunities for those in-service teachers who were in real need of improving their educational skills, scientific knowledge, and training for teaching. Having accomplished and improved education for practicing teachers, which were the 1955 goals, the NTIs were

gradually closed in 1965. These were replaced with new institutions for preservice teachers, which was known as Elementary Teacher Preparation Institutions.

Elementary Teacher Preparation Institutions (1966-1985). Elementary Teacher Preparation Institutions (ETPIs) were somewhat equal to a high school level of education and preservice teachers had to attend them for at least three years of study. The goals of these institutions were to develop more effective teaching plans and programs, meet modern Saudi society's needs, and generally to improve teachers' knowledge so that they would better prepare their students. Students who had completed middle schools were qualified to enroll in ETPIs. Upon completing three years of study at ETPIs, the students earned the Elementary Teacher Preparation Certification, which allowed them to teach in elementary school levels (Teachers Colleges Documentary Report, 2000).

Science and Mathematics Center (1974-1988). The Ministry of Education did not stop at that point but proceeded to change curriculum plans and further develop professional training programs. In 1974, as a fruit of its efforts, the Science and Mathematics Center was opened to provide intensive training to preservice teachers to teach science and mathematics at the middle school level. In 1976, there were a total of twenty ETPIs, which enrolled 7483 students. At the end of 1977, ETPIs began to gradually decrease due to the establishment of new schools of education, which were called Junior Colleges (JCs). By 1985, there were no ETPIs in Saudi Arabia. Thus, in a matter of forty years, elementary school teachers went from receiving four years of education to receiving fourteen years of education (Teachers Colleges Documentary Report, 2000).

Junior Colleges (1975-1989). Over the last five decades, the standards for teacher training have been rising steadily. For instance, the necessary teaching qualification only

required an elementary level certificate in 1940's, whereas it was raised to require a Junior College Diploma in 1975 (Alsalloom, 1995). In 1976, there were two Junior Colleges (JCs), which enrolled 334 students, and employed 28 faculty members. The JCs granted Junior College Diploma certificates. Students could major in one of the following areas: Islamic studies, Arabic language studies, science and health, mathematics, physical education, art education, or history and geographic studies. By 1988, there were eighteen JCs, which enrolled 7747 students, and employed 842 faculty members. These JCs were located around the country thus were more accessible to students in rural areas. By the end of the 1988 academic school year, the Ministry of Education discontinued granting admissions to the JCs because the Ministry of Education upgraded qualifications to require bachelor degrees (four years at the post-high school level) rather than the previous 2-year JC diploma (Teachers Colleges Documentary Report, 2000).

Teachers Colleges (1989- to present). In 1989, the Ministry of Education established eighteen new four years schools that were named Teachers Colleges (TCs). The goals of these institutions were to prepare students educationally and academically, improve in-service teachers' teaching skills and scientific cognition, contribute to educational and academic research, plan effective and needed programs, and cooperate with other national and international educational organizations. In the TCs, generally, the students are required to study certain courses in the three following areas: seventy-seven credit hours in general courses, forty-five credit hours in professional education courses[1], and forty-seven credit hours in major subject area courses (Teachers College Student

[1] Professional education courses refer to all courses that are concerned with student educational preparation aspects such as, but not limited to, teaching methods, education, curriculum, educational psychology, educational research, Saudi educational system, classroom management, and school administration.

Guide Handbook, 2002). In 1989, there were 10,435 students and 1021 faculty members in all eighteen of educational colleges, whereas by 2000 the enrollment had more than doubled to 23,496 students and 1926 faculty members (Teachers Colleges Documentary Report, 2000).

Teachers Colleges currently are the only specialist educational institutions that aim to prepare teachers for elementary schools, whereas educational colleges in other universities have the goal of preparing teachers for middle and secondary schools. Like other countries, such as Japan (San, 1999), Germany (Jones, 2000), and Ethiopia (Bekalo and Welford, 1999), the students are granted bachelor degrees in elementary education or secondary education, respectively.

In 1998, the Ministry Agency of Teachers' Colleges began to require more specific subject matter competencies within the broader subject area majors. For example they opened three minors under the science major in four colleges that are located in the following cities: Riyadh, Holy Mecca, Dammam, and Taif. These minors are expected for teachers who teach science beyond elementary school level. Minors (an area of concentration) are: (a) Biology with ninety-two credits, (b) Chemistry with ninety-six credits, and (c) Physics with ninety-four credits. In the first three years, all science students – regardless their minors – study exactly same courses, which equals to eighty credit hours of the total credit hours listed in a, b, and c science areas. However, in the first semester of their senior year, science majors specialize in only one area; that is either biology, chemistry, or physics. Finally, they spend the entire second semester of the senior year performing a teaching practicum in a secondary school. Regardless of their minors, students study twenty-two general courses, which provide a breadth of non-major classes

such as Islamic culture, Arabia studies, Islamic economy, history, art, … etc; and thirty-one professional education courses, including pedagogy and curriculum courses (Teachers College Student Guide Handbook, 2002).

Problem Statement

The Saudi government, especially the Ministry of Education, has paid consistent attention to teacher preparation for several decades as a means to enhance the Saudi preservice teachers' learning outcomes. Thus, in order to gain a deeper understanding of ideas of various stakeholders, in this teacher education, including content area specialists (i.e., academic subject area professors), professional education faculty members, and preservice science teachers, it is imperative to explore these involved parties' conceptions of an effective science teacher education. Only by thoroughly understanding these three perspectives will the Ministry of Education be able to develop a sound science education program. While reflecting on the responsibility of TCs to prepare successful and effective prospective teachers to teach science in secondary schools, I decided it was necessary to explore the conceptions of academic professors, professional education faculty, and preservice science teachers about their ideas of ways to best train science teachers. The main purpose of this study is to investigate the conceptions of academic professors, professional education faculty members, and preservice science teachers related to the science program to teach science in middle and high schools in Saudi Arabia. Ultimately, the goal of the study is to use the generated information to improve current science programs and develop better preservice teacher practices in science.

Literature Review

Several research studies (Bekalo & Welford, 1999; Jones, 2000; San, 1999) emphasize that in order to improve science teaching programs, students must be adequately prepared while they are enrolled in teacher education programs. Considering preservice science teachers' conceptions of teachers and teaching is an important means to eventually facilitate not only learning the content necessary for science teaching, but also for learning how to teach (San, 1999).

Looking carefully at the literature about what had been investigated, it was found that many studies touched upon an imperative issue, which was the relationship between theory and practice. In their article, Bekalo and Welford (1999) state that the lack of integrating appropriate practices in teacher education science program might lead to preservice teachers to fail in their teaching. They explained that science teachers encountered a serious difficulty in understanding the "practical approaches," and how practices could effectively promote active learning. Furthermore, a study conducted by San (1999) shows that conceptions of teacher education in Japan were very theory-based. For instance, elementary preservice teachers spent four weeks in student teaching, whereas the secondary preservice teachers spent only two weeks. He concludes that the initial teachers' preparation, including the professional education stage, resulted in their practical knowledge and their actual teaching experiences being very brief and insufficient. In Germany, Jones (2000) states that preservice teachers "would benefit from an even greater emphasis on practices related subject methodology. Almost all trainees expressed a wish for less emphasis on theoretical aspects in favour of practical ones" (p. 71).

According to the Teachers College Student Guide Handbook (2002), in all science minors (biology, chemistry, and physics), students are required to earn at least eighty total credits in science and an average of additional fourteen specialist credits in the area of their minors. That is, the total will be approximately ninety-four credits in science out of approximately 147 credits, and the remaining, fifty-three credits, are divided as twenty-two credits for general courses and thirty-one credits for professional education courses. This imbalance between college-based courses and field-based experiences indicates that the science program in TCs emphasize the theoretical approach rather than the practical one.

Another critical issue related to teaching science concerns the nature of science teaching method courses. Because it is very important for preservice science teachers to develop their own science course objectives and to help their pupils understand ideas about the world of science through personal experience, science methods course is one of the fundamental courses of the teacher education science program. The science method course is designed for preservice teachers to gain greater proficiency about the nature of science teaching in both middle and high schools. The major aim of this course is to develop appropriate instructional skills and strategies for teaching secondary science. The course also aims to provide undergraduate students at the senior level of their college careers with general science concepts; particularly concepts that help them teach the nature of science. It also gives students opportunities and encourages them to incorporate new tools, illustrations, and materials from the surrounding environment to use when they teach science.

While they earn their bachelor degrees in TCs, the preservice teachers are required to enroll in only one science teaching method course, which is equivalent to two credit

hours. Such a course is inadequate for the preservice teachers to gain significant, in-depth knowledge about various teaching science methodologies. This science teaching method course as it currently is being taught in TCs does not "give equal weighting and allowance to academic and pedagogical study, resulting in lack of motivation and interest associated with the low-credit method courses" (Bekalo & Welford, 1999, p.1307). Therefore, the amount of time spent in the science method course must be increased. As Alsabagh suggests (1997) a more substantive methods course must be required if the preservice teachers are to acquire sufficient foundations regarding teaching methods and strategies to teach science effectively (Aljabur, 1992).

It is not only the professional science educators who emphasize the important of the science methods course. According to Aljabur (1992), the preservice teachers regard teaching method courses as the most important courses that are taught in teacher education programs. Tairab (2001) also concludes that methods courses positively affect science preservice teachers' perspectives about the nature of science. Such approaches to science education will improve their science teaching both in their student teaching and real teaching career. It is obvious how important it is for preservice teachers to be exposed to methods courses so they can use different teaching strategies (Morin, 1996), such as lecture, discussion, cooperative learning, demonstration, problem solving, and educational game. San (1999) and Van Der Valk and Broekman (1999) explain that even though preservice teachers do not have real previous teaching experiences, they can teach science by using different strategies, which depend completely upon their prior knowledge and life experiences as learners. In another study done by Alshahrani (1998), which was conducted in King Saud University School of Education in Saudi Arabia, the author recommends the

necessity of establishing laboratories for science teaching methods courses. The goals of such laboratories are to facilitate the process of acquiring a variety of skills needed to perform hands-on activities prior to student teaching.

However, Hamman (1998) argues that even with the support and encouragement for preservice teachers to use different teaching methodologies, they tend not to use them unless they have had experience with them prior to the practicum. He lists several factors that might prevent those preservice teachers from using such methodologies, including time limitations, concentration on curriculum, superficial knowledge of teaching methodologies, and lack of awareness of the importance of teaching methodologies.

In addition, based on their research, Bekalo and Welford (1999) conclude that teaching methods courses (e.g., physics) actually do not contain hands-on activities and other teaching strategies that could be used in classrooms by different teachers. Their study reveals that such general methods courses are taught in a traditional manner; that is, mainly they consist of lectures. They also found that general science methods course is provided for all preservice teachers regardless of their majors in the college. Thus, they conclude that such courses are theory-based but not practice-based instruction. Based on my own experience, I would make the claim that this situation found by Bekalo and Welford (1999) in Ethiopia is the same as it is in Saudi Arabian TCs.

As mentioned earlier in the introduction section, the professional education courses include thirty-one credits to be studied over the complete four years period. Professional education courses that are provided by Japanese universities to preservice teachers are also very low in number (San, 1999). The same conclusion is found in Merrett and Wheldall's study (1993) in the United Kingdom. In that study, out of 176 secondary school teachers

surveyed, 132 teachers are not satisfied with their initial professional preparation. They are especially concerned with the lack of preparation for classroom management. Therefore, these secondary teachers said that more consistent attention should be directed to what was covered in professional education courses. Another study done by Nottis et al. (2000) conclude that there is still a need to better distinguish between theoretical and practical approaches regarding the classroom management, and Aleiwni (1992) the use of various assessment strategies.

Several studies, including those done by Badi (1996), Aljabur (1992), and Alsabagh (1997), were conducted to investigate professional education courses in teacher education programs in Saudi Arabia. All of these authors unanimously agree that the number of professional education courses is insufficient as is the content of the current professional education courses. Thus, they strongly recommend increasing the credit hours and modifying content of such courses in teacher education programs.

Method

The study investigated the conceptions of academic professors, professional education faculty members, and science preservice teachers[1] in Riyadh Teachers College (RTC) in Saudi Arabia about science program preparation (Biology, Chemistry, and Physics) paths. Therefore, I decided to obtain data and accurate information from the three listed parties. I conducted the study as a requirement for a graduate course. The study was conducted during the senior fall semester of the 2002 academic year at RTC.

[1] The preservice teacher is a student who is in his last semester of teacher education program and has completed all of the required course work, registered in the internship course, and is teaching his specialization area to a single grade or to a number of the grades in one of the public schools that the TC directs to by arrangements with the center of education administration.

That examined one subject area science program. The research design was a pilot preliminary case study. The participants were asked to be interviewed to determine the extent to which the current science program had developed knowledge, skills, and attitudes for teaching science. The main data source was an open-ended survey in which participants were requested to write elaborated narrative responses. By conducting interviews, I was able to obtain specific information about all science minor programs as well as to know what the attitudes were of academic professors and science preservice teachers toward the science program. Due to the impossibility to travel to Saudi Arabia during the fall semester 2002 and the time considerations, the survey's questions were open-ended and required written responses. To ensure the validity of this survey, I had a conference with Brantlinger, Ellen, a faculty member in Curriculum and Instruction department, Special Education. In that meeting, Brantlinger suggested some comments and changes on the survey's questions. Later, I had another conference with Andersen, Hans, a faculty member in Curriculum and Instruction department, Science Education. Andersen approved these survey's questions. Therefore, these questions (see Appendix A, Appendix B, and Appendix C) were sent to Alfaleh, one of my professor colleagues in the RTC. He distributed them to the participants, and then he mailed participants' responses to me.

The Study's Sample

The sample consisted of eleven participants, including six (54.5%) science preservice teachers, who were performing their student teaching,[1] from the three science minors (two biology, two chemistry, and two physics), three (27.2%) academic professors

[1] Student teaching is one of the professional area courses in all teachers colleges. Preservice teachers are required to register for this course after completing all the requirement courses. Preservice teachers spent a full semester in their schools teaching subjects in which they are majored.

from science minors (one biology, one chemistry, and one physics), and two (18.3%) professional education faculty members from the Curriculum and Instruction department.

Participants were purposefully selected. Merriam (2001) described one of the most common types of purposeful sampling, that was, the *snowball form*. Because I was one of Alfaleh's undergraduate students in the elementary science education program, I knew him very well. Furthermore, during the summer of 2002, Alfaleh and I had intensive discussions about possible research topics related to TCs. We also visited the Educational Research Center at the Education College in King Saud University in Riyadh to obtain research studies previously done regarding preservice teacher preparation science program done in Saudi Arabia. As a result, he was the first selected participant and, he then suggested another faculty member from the Curriculum and Instruction department. Based on his productive teaching experience and acquaintance with students in RTC, I asked Alfaleh to identify six science students. These practicing students are seniors and are doing their student teaching (final semester). In respect to academic professors, Alfaleh also suggested three names of faculty whose opinions he thought would be helpful for this particular study.

Gaining Access

With respect to gaining access for this case study, it is possible because I conducted the study in the college where I taught prior to coming to graduate school and where I will return when I complete graduate school. Before collecting any piece of information took place, I sent a letter to each participant asking him whether he was willing to be a part of the study or not. That was, I did not want to deceive the participants through the use of

deception and coercion. Having clear goals and direct methods from the beginning of the study helped me gather accurate data to achieve the study's goals.

Data Analysis

Analysis consists of several processes. Initially, I read through all responses and write brief notes of themes, which facilitated the development of contact summary sheets as the analysis progressed. As I read through the data, particular ideas and thoughts, patterns of behavior, attitudes, and important words and phrases repeatedly stood out. The preliminary codes were developed during the second reading of the responses (Merriam, 2001). I attempted to sort these under such themes (general phrases and words), which became my coding categories and subcategories. By these means, I eventually organized the study's data for this report of my study's results.

Codes include, but are not restricted to, satisfaction with the science program, effectiveness of major courses, required credits for graduation, importance of the courses' content, effectiveness of the internship semester (teaching practicum), relationships between the preservice teacher and their professional education advisors, the effectiveness of the role of the science monitor teacher and the school administration, satisfaction with methods courses, increasing what is taught about assessments, and classroom management strategies. I dropped, refined, and revised some of these codes as more pertinent categories arose. As far data analysis, I carefully selected the most specific codes that answer the stated research questions in relation to the study's purpose.

Validity of The Study

To ensure the validity and consistency of this study, basically *peer examination* was used and had been a useful strategy to enhance the validity in this qualitative research.

Peer examination involved working with the written comprehensive narrative responses and emergent findings (Merriam, 2001). Once I completed the findings and discussion section, I sent copies of them with copies of participants' responses without their names to two of my colleagues who teach in Curriculum and Instruction department in Teachers Colleges in Saudi Arabia. They were Alsalowli and Ben-Motreb, who graduated from Besha Teachers College and Riyadh Teachers College, respectively. Both Alsalowli and Ben-Moterb are lecturers in Alhasa Teachers College and are completing their doctoral degrees in Curriculum and Instruction department at Indiana University in Bloomington, Indiana.

As a result, I asked those faculty members to comment on the study's findings and compare them to the original written narrative responses that I sent to them. Consensually, they approved the study's findings and declared that they appropriately match the participants' written responses.

Another strategy used to enhance the validity of the study was the *researcher's biases*. In 1998, as earlier mentioned, the Ministry Agency of Teachers' Colleges opened three minors (biology, chemistry, and physics) under the science major for teachers who are willing to teach science beyond elementary school level. As a researcher, who obtained a bachelor degree in Science Elementary Education from RTC in 1996, I have no assumptions about the three minors. However, I have assumptions and biases prior to conducting this particular study regarding both general and professional education preparation because no changes took place in these two areas since I graduated from RTC. In this study, I would completely support all six preservice teachers' conceptions, as will be clarified in the findings section, about their general preparation courses. That was, such

courses were been beneficial in teacher education program. However, there were lots of credits hours, and they had very comprehensive details that would not be beneficial in teaching science.

As far as professional education preparation courses, I believed that I had sufficient background and information. However, I thought that methods courses, especially science methods, were not enough. Thus, I emphasize the importance of increasing science methods course credit hours.

Research Questions

As previously stated, the purpose of the study is to deeply explore and understand the conceptions of both academic and professional faculty members and preservice science teachers regarding the science program to teach science in both middle and secondary schools in Saudi Arabia. Accomplishing such a goal will help the Ministry of Education to improve existing science programs and develop better preservice teacher practices in science.

Based on the reviewed literature, I am interested in the following extensive research questions to reveal and illustrate the stated study's purposes:

1. How satisfied are the academic professors and the professional education faculty members about the course work that prepares science preservice teachers to teach science?
2. How satisfied are the science preservice teachers about the course work that prepares them to teach science?
3. How satisfied are professional education faculty members about general and science teaching methods courses?

4. How satisfied are the science preservice teachers about general and science teaching method course?
5. How do professional education faculty members think of including topics such as assessment strategies and classroom management techniques in professional education preparation benefit the science preservice teachers?
6. How do professional education faculty members the science preservice teachers think of including technique about dealing with difficult teaching situations in professional education preparation?
7. What are the academic and professional education professors' attitudes toward important and unimportant courses?
8. What are the science preservice teachers' attitudes toward important and unimportant courses?
9. How important do the professional education professors and the science preservice teachers think the student teaching practice is?
10. How important do the professional education professors think the weekly conference with the preservice teachers is?

Research Results and Discussion of Results

This section reports on study participants' satisfaction with the current science preparation program, professional education development in the majors program, and their feelings about methods courses. It includes also a number of topics related to professional education preparation, including classroom management, assessment strategies, and differences in teaching. The next section provides an analysis of the academic and professional education professors satisfaction with the current program.

Academic and Professional Education Professors' Satisfaction with The Current Program

In general, the three academic and two professional education professors who were interviewed were satisfied with the science preparation program. They believed that the current science program and its required credit hours for graduation, including specifically biology, chemistry, and physics minors, were sufficient to prepare preservice science teachers to teach science effectively at the secondary school level. The academic professor from the biology department explained,

> Since the science program prepares the preservice teacher to be a biology, chemistry, or physics teacher, the idea [of science minors] is good. It is a developed extension of the Science [and Mathematics] Center, which proved its success in the past in developing qualified and meritorious teachers.

When they were asked about the effectiveness of courses in each minor, academic department professors were less satisfied. For instance, the physics professor said that physics courses are appropriate in the general preparation, but there is a need to connect scientific concepts with practical experiments. He explained,

> The physics department needs more laboratories to conduct more experiments related to scientific concepts that are taught in theory-based physics courses. Physics courses follow traditional teaching methods [lectures] and lack varied teaching methods.

Similarly, a professional education professor explained,

> Even though the science program concentrates on scientific content knowledge, it is obvious that it lacks the mechanism to transform such scientific knowledge to preservice teachers because most professors in the Riyadh Teachers College use the traditional teaching method approach, which is lecturing.

The same conclusion about the nature of instruction was found in Kelly's study (2000). Kelly stated that in the United States, the required science courses were usually instructive, lecture-based presentations with a concentration on thorough coverage of facts and theories rather than on practice, understandings, and applications. In that study as in my study in

Saudi Arabia, faculty maintained that this approach was the result of their own lack of access to adequate laboratory equipment.

As a result of insufficient equipment, my participants recommended that the college should concentrate on establishing more laboratories for practices that involved combining scientific theory and content with applied demonstration. Thus, the three academic professors stated the importance of having such laboratories to use in preparing preservice science teachers. They declared that laboratories had the benefits of their being able to connect theoretical knowledge to practical experiments, link concepts with one another, provide more opportunities for good observations and explorations, and ultimately to help preservice teachers to think more scientifically and critically. A professor from the chemistry department conjectured that such laboratories could be "the soul of the curriculum." There was a consensus between the academic and the professional education professor participants that having laboratories in the future for preservice teacher preparation in the secondary science program in RTC was imperative.

Another theme that emerged from the responses was the need to develop stronger links between college courses and what was to be taught in public schools. A professional education professor explained the appropriateness of the science program but pointed out for more applied content:

> The general preparation provided in of their courses is appropriate. The professional education courses are appropriate in terms their quantity, but it would be better if the "system of education" course were canceled and, instead of it, introduce new advance courses such as educational research and evaluation and measurement. The major preparation courses are very appropriate and sufficient, but it would be more helpful if they were related to what is being taught in public schools.

Several studies in Saudi Arabia and elsewhere, including those done by Aljabur (1992), Bekalo and Welford (1999), Jones (2000), and San (1999), concluded that college courses in the teacher education program were not organized in ways in which preservice teachers could not relate them to what was they would eventually teach in middle and high schools.

Preservice Teachers' Satisfaction with The Science Program

General preparation. Consensually, all six preservice teachers believed that their general preparation courses (e.g., arts, Arabic composition, and Arabic calligraphy) were good. However, all six also felt that the program required to many credits hours of course work. More particularly, it was mentioned that their general preparation courses had very comprehensive details that they felt that they would not use in when they teach science in public secondary schools. For example, a preservice teacher from the biology department said, "in the program, there are many courses that are not related to what I am going to teach, therefore, they are not significant to me as a science preservice teacher." The required general education credit hours were twenty-two. Others also said that the general courses had little benefit to their preparation for teaching science, as a preservice explained, "these courses obstructed us from concentrating on our major courses."

Based on my own experience in the preservice program, when I heard similar sentiments expressed in casual conversations with my students, so I would agree with preservice teacher participants' conceptions about there being too many general preparation courses and thus would support reducing the required number of credit hours. These courses should be limited to what is actually taught in secondary schools. Including related general courses (non-science courses) in teacher education program would without doubt give preservice teachers more and productive opportunities to pay a great deal of

attention to their majors courses and would reduce psychological stress that is caused by the large credits number in the general preparation area.

Professional education preparation. In terms of professional education course work, all six preservice teachers in all three of the minors thought these provided enough preparation. A preservice teacher from the biology department said, "I think that the professional education preparation courses are the most beneficial courses that I studied in my education training." Additionally, all six preservice teachers agreed that the required credit hours for professional education preparation were very appropriate.

Major preparation. Generally, all six preservice minor students felt that major course work was good as science courses. However, some of them felt that some of the courses they had studied were not related to what they would teach in secondary schools such as "modern physics (2)", "modern physics laboratory (2)", and "heat and thermal dynamics." Therefore, they viewed such courses just as requirements for graduation. Still on this perspective, preservice teachers believed that the required credit hours number was relatively small. For instance, a preservice teacher from the biology department said, "the more beneficial major courses are introduced, the more the preservice teachers will build a solid content foundation."

Responders' Satisfaction with Methods Courses

Questions that related to satisfaction with methods courses were only asked to professional education faculty members and preservice teachers. Therefore, in this section, I report both professional education faculty members and preservice teachers' perspectives of methods courses. Based on his four-year qualitative study, Kelly (2000) stated that there was growing evidence that supported the idea of including various science methods

courses in teacher education programs. To prepare individuals who will be better, more effective science teachers, he declared science methods courses are considered a central element in teacher preparation programs. Furthermore, Kelly (2000) said, "data … has shown that the methods course impacted most students positively. There is evidence that students gained new insights and understandings that may not have been apparent to them previously" (p. 771).

Even though the science methods course at RTC is equivalent to only two credit hours for students with any science minor, all of the six preservice teachers expressed strongly positive attitudes towards the methods course. They felt it was effective and helpful to their student teaching practice. They declared that methods course especially prepared them well in terms of developing and planning lessons as well as using various teaching methods and strategies. However, professional education faculty members argued that even though preservice science teachers benefited from this course, the advantage of such a course was inadequate in scope and comprehensiveness for preparing these science preservice teachers to teach science in secondary schools, and therefore, need to be increased. One professional education faculty member said,

> "Preservice teachers barely benefit from general methods courses because the enrollment in these courses is very large where it sometimes reaches fifty-six students in a small classroom. However, preservice science teachers acquire more effective practices microteaching[1]. The total credit number [two credits] of science methods course should be increased."

The necessity of having sufficient course work credit hours in science methods courses in Saudi Arabian education colleges has also been recommended by Alsabagh (1997) and Zytoon and Alkhaledie (1996). Zytoon and Alkhaledie (1996) and Alshahrani

[1] Microteaching is a technique that is used in methods courses on teacher education program as a part of a lesson. This lesson is taught to a small number of peer students, usually 4 to10 students.

(1998) went beyond recommending increments the by suggesting that establishing special laboratories for methods courses was important because preservice teachers could easily practice teaching without pressure and anxiety that might occur in real classrooms when they did not have laboratory exposure after their college preparation. In addition, Zytoon and Alkhaledie (1996) suggested several obstructions that might impede preservice teachers from taking advantage of methods courses, including time considerations and the large number of students than would teach in their real classrooms in the future.

Also, several researchers, including Aljabur (1992), Alkatherei et al. (1990), Alshahrani (1998), Pipe and Richards (1992), Kpanja (2001), and Zytoon and Alkhaledie (1996), strongly advocate that microteaching has long been suggested as one of the most effective training methods for teaching pre-service as well as in-service teachers to develop various types and stages of professional teaching. In such a technique, instructors and peers give the preservice teachers immediate feedback on their performances. In the survey's questions, I did not ask about microteaching. However, it was emerged from a professional education faculty member's response as an effective technique to teach science.

The Importance of Particular Content in Teacher Preparation

One of the study's interview questions was related to necessary course content and particular teaching skills, including using different types of assessment strategies, classroom management techniques, and dealing with difficult instructional situations.

Classroom management techniques. Merrett and Wheldall (1993) wrote, "in reality, students tend to be taught a great deal about the content of syllabi and the planning of lessons but the business of bringing about successful learning outcomes or how to manage a class is rarely addressed" (p. 2). They concluded that the practical management training

was insufficient in the United Kingdom, thus they suggested a classroom behavior management course should be part of the teacher education program. In my study, one professional education faculty member concurred, "I think it [classroom management strategy] is not adequate because there is no special course that deals with this issue, but it is part of a course." As far as classroom management, in his study, Aleiwni (1992) found that out of 191, 114 academic professors and out of 29, 18 professional education professors agreed upon the importance of pupils arrangement in the classroom for effective teaching, classroom and laboratory management, paying equal attention and observation to pupils

When the professional education faculty members and the preservice teachers were asked about whether the science program trained the preservice teachers to encounter various difficult instructional situations in real life teaching or not, both professional education faculty members explained that they did not think that the professional education preparation courses effectively prepared preservice teachers to deal with unexpected and difficult situations in teaching. A professional education faculty member said, "in studying some professional education courses, … faculty members in RTC do not apply what they teach in these courses to real life teaching situations." According to the perspectives of preservice teachers on such a matter, all six preservice teachers thought that the professional education courses provided them with a relatively acceptable background regarding dealing with difficult teaching situations in real teaching. However, out of six preservice teachers, four felt that to be able to handle complicated situations, more practices were needed during student teaching prior to real teaching life. Aleiwni (1992) showed that out of 191, 150 academic professors and out of 29, 22 professional education

professors emphasized the importance of dealing with difficult teaching situations. These findings led to the conclusion of the significance of including a course to the science teacher education program to ensure the effectiveness of teaching science in secondary schools.

Assessment strategies. Another issue related to assessment was found to be sufficiently presented in the science education program in RTC, which was contrasted with my hunch prior to conducting this study. Upon the completion of methods course, the preservice teachers were able to use different assessment strategies, including multiple chose questions, true/false questions, match questions, completion questions, essay questions, and open-ended questions, to assess their students' learning outcomes in secondary schools. Both professional education faculty members said, "the benefit of using various assessment strategies is moderate." Another professional education faculty member went further and explained, "assessment strategies are enough in the program. They are presented in three courses: evaluation and measurement, general teaching methods, and science teaching methods courses." In Aleiwni's study (1992), he concluded that evaluation competence was very important in the science teacher education program. He found that evaluation competence consisted of using assessment strategies, the use of assessment's outcome to improve teaching, the use of various written and oral test methods, and the measurement of pupils' practical skills by observation.

Attitudes Toward Important and Unimportant Courses

Academic and professional education professors' attitudes. Regarding the most and/or the least important courses that should be and/or not be included in the preservice teacher science program, there was one response that indicated that courses such as system

of education and general foundation of education should not have been included as requirements in science program because they were not directly relevant to teaching science. These courses should be replaced with courses that related to developmental psychology, evaluation and measurement, and teaching methods courses. However, the three academic professors and one professional education faculty member consensually agreed that there were no courses that were considered unimportant courses. Not surprisingly, each participant of them listed his department's courses, but one participant listed that Islamic, Arabic, English, and mathematics courses were very important to the science program. Such courses, as Aljabur (1992) and Alkatherei et al. (1990), explained would positively help prepare preservice teachers culturally, politically, socially, and economically in ways that were apposite to their teaching role in the future.

Preservice teachers' attitudes. On the other hand, all six preservice teachers in all science minors thought that the most important courses in their science preparation program were professional education and major courses. For instance, a preservice teacher from the physics department said, "major courses are the most effective and helpful, so they are at the first rank. Then, at the second rank is the professional education courses." Moreover, the six preservice teachers stated consensually that the least important courses were those that were taught in the general preparation because they are merely a basic extension of what they studied in high schools. Also, these courses are not related to their science program, so they were, as one preservice put them, "extra credits and additional loads in every semester."

Student Teaching

Student teaching has been shown to be particularly beneficial to preservice teachers because it exposed them to more opportunities to develop and make judgments about the effectiveness of the content knowledge that they had studied in their majors. It also measured the pedagogical techniques that were used in real classrooms (Kelly, 2001). In this study, all professional education faculty members and preservice teachers consensually emphasized that student teaching was the most important part of the teacher education program. Although the student teaching semester is the beginning of their teaching journey, it is vital part because it might be the last opportunity for them to have someone observe and guide their teaching (Mitchell & Schwager, 1993; Rogers, 1995). Student teaching as described by a preservice teacher from the chemistry department, "I consider the student teaching semester the fundamental base for teaching." Another preservice teacher from the biology department said, "I expect that the student teaching semester will be a productive time where communication among the school, teachers, students, and preservice teachers can be very helpful."

Regular Communication Between Faculty and Preservice Teachers "Weekly Conference"

As part of the teacher education program, the weekly conferences between the academic supervisor [1] and preservice teachers were considered essential component in the science preparation program. Such conferences take place during the student teaching semester. In these conferences, the preservice teachers sit down with their college supervisor to discuss various topics that the preservice teachers encountered during their

[1] The academic supervisor is a faculty member in the Teachers Colleges who is assigned to supervise preservice teachers for a full semester during the student teaching at their schools and through weekly conferences. This faculty member must have at least a master degree in curriculum and instructions and have a bachelor degree in the preservice teachers' majors.

teaching at schools and issues related to science teaching. Lopez-real et al. (2001) explained some topics that might be included in these conferences as follows: (a) classroom skills, which include assessments and time management; (b) teachers' attitudes, which include relationships with school administration, teachers, and pupils; and (c) personal aspects, which include enthusiasm, commitment, and presence. A professional education faculty member explained, "the weekly conference is very advantageous, and the amount of benefit that preservice teachers can acquire from it completely depends on the comments and feedback, which are proposed by the academic supervisor." Furthermore, Lopez-real et al. (2001) declared, "the supervisory conference[s] can help us to better understand the supervision process and hopefully encourage better practice" (p. 161). The same conclusion was found by Talvitie et al. (2000), they stated that the academic supervisors played an important and a meaningful role in their preservice teachers professional development. Academic supervisors offered effective dialogues that were maintained during the student teaching practice. Also, they revealed that the more open the communications and the more various the opinions allowed, the more satisfied the preservice teachers were with their student teaching practice.

Conclusion

The purpose of this research was to explore the conceptions of academic and professional education professors and science preservice teachers in relation to the science preparation program in Riyadh Teachers College in Riyadh, Saudi Arabia. Only by carefully understanding these three perspectives will the Ministry of Education be able to develop and improve effective science education program.

In conclusion, the overall perspective of the investigated participants was that they generally were satisfied with the science program. Even though academic and professional professors agreed upon the sufficiency of the general preparation courses, the preservice teachers were not satisfied, and they demanded to have these courses reduced. Instead, they insisted on increasing major courses because majors courses, as they believed, were not sufficient to best prepare them to teach science in secondary schools.

Finally, considering the importance of methods courses based on professional education faculty members and preservice teachers, it would be more helpful and useful if the amount of credits designed for methods courses were increased. Furthermore, there was a need for introducing different issues, including classroom management and dealing with difficult teaching situations as a separate course.

Limitations of the Study

This research study examined one subject area, which was the science program in Riyadh Teachers College in Saudi Arabia. The selection of science preservice teachers was limited to those who were doing their student teaching practice. While this research study could be generalized to other Teachers Colleges that have the same science programs, this research was conducted entirely within only Riyadh Teachers College. Although this study may be used to make generalizations, ongoing research is necessary to draw conclusions from a larger population related to the conceptions of science preservice teachers in relation to their preparation to teach science in secondary school level.

A second limitation of this study worth noting involved the sampling procedure. That was, the investigated science preservice teachers were more to be a homogeneous group, as Johnson (1994) put it. Because all science preservice teachers were enrolled in

the same program of teacher education, which meant that the instructions and supervision that they received were relatively similar. Therefore, the findings may not be meaningfully applied to different teacher education programs.

Finally, since data was collected only on the basis of an open-ended survey question strategy that required elaborated narrative responses, the study's design did not accommodate certain data triangulation strategies such as observation, document inspection (e.g., course evaluation, evaluation of student teachers) to enhance internal validity. Also, because the research was by necessity conducted at distance, member checks to confirm the survey results with participants were not feasible.

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Appendix A

Academic Professors' Questions

1. How satisfied are you about the preservice teacher preparation science program? Please chose your area of concentration either biology, chemistry, or physics.
2. How effective do you feel the major courses are to the science preservice teachers in their future teaching life?
3. What is your opinion of the number of hours that are taught in the general, the educational, and the major preparation?
4. How do you evaluate the science preservice teachers' benefit from the practical courses in their major?
5. What are the most important courses that you think have a positive impact in improving the science preservice teachers scientific knowledge? Why?
6. What are the least important courses that you think have a negative impact in improving the science preservice teachers scientific knowledge? Why?

Appendix B

Professional Education Faculty Members' Questions

1. How satisfied are you about the science preservice teachers preparation science program (the general, the educational, and the major preparation)?
2. What is your opinion of the number of hours that are taught in the general, the educational, and the major preparation?
3. How effective do you feel the student teaching semester (internship) is for the science preservice teachers?
4. How do you view the weekly conference between the professional education faculty supervisor and the science preservice teachers?
5. How important do you think the general and science methods courses are for the science preservice teachers?
6. How do you evaluate the science preservice teachers' ability to use various classroom management techniques?
7. How do you evaluate the science preservice teachers in terms their ability to use different assessment strategies?
8. How well have the science preservice teachers been prepared to encounter various difficult educational situations in real life teaching situations?
9. What are the most important courses that you think have a positive impact in improving the science preservice teachers educational knowledge? Why?
10. What are the least important courses that you think have a negative impact in improving the science preservice teachers educational knowledge? Why?

Appendix C

Science Preservice Teachers' Questions

1. How satisfied are you about the science preservice teachers preparation science program (the general, the educational, and the major preparation)?
2. How effective do you feel the major courses are to your future teaching life?
3. What is your opinion of the number of hours that you studied in the general, the educational, and the major preparation?
4. How helpful is the student teaching semester (internship) for your teaching?
5. How important do you think the general and science teaching methods courses are for your teaching?
6. How well prepared do you think you are to encounter various difficult educational situations in real life teaching situations?
7. What are the most important courses that you think have a positive impact in improving your scientific and educational knowledge? Why?
8. What are the least important courses that you think have a negative impact in improving your scientific and educational knowledge? Why?